

REMARKS

The present Amendment amends claims 1, 4-8, 10, 11, 13, 14, 16, and 19, and leaves claims 2, 3, 9, 12, 15, 17, 18, and 20 unchanged. Therefore, the present application has pending claims 1-20.

Specification

The Examiner objected to the title, asserting that the title is not descriptive. Applicants have amended the title in accordance with the Examiner's suggested new title. Therefore, this objection is overcome and should be withdrawn.

35 U.S.C. §112 Rejections

Claims 1-20 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. More specifically, the Examiner alleges that the terms "performance value" and "specification value", which are recited in the claims, are not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. This rejection is traversed for the following reasons.

Applicants submit that the features of the present invention, as now more clearly recited in claims 1-20, fully comply with the requirements of 35 U.S.C. §112, and as such, the subject matter recited in the claims is based on a disclosure that is enabling. Therefore, Applicants respectfully request reconsideration and withdrawal of this rejection.

I. Claims 19-20 Do Not Recite “Performance Value” or “Specification Value”

Contrary to the Examiner’s assertions, independent claim 19 and dependent claim 20 do not recite the alleged non-enabling subject matter (i.e. “performance value” and “specification value”). Therefore, the Examiner has not provided any basis for rejecting claims 19 and 20 under 35 U.S.C. §112, first paragraph. Accordingly, this rejection of claims 19 and 20 should be withdrawn.

II. “Performance Value” and “Specification Value” Are Described in the Specification in Such a Way to Enable One Skilled in the Art to Make and/or Use the Invention

The Examiner alleges that it is unclear if the performance value included in the history information is the same performance value included within the specification values. The Examiner further alleges that if the performance values are the same, then it is unclear as to what makes the history information different from the specification information.

As now more clearly recited in the claims, the operation history includes performance values of a disk group. These performance values are obtained upon the actual operation of the storage device. The performance values obtained for the operation history are a historical documentation of the operation of the storage device.

Like the operation history, the specification values also include performance values. Specifically, the specification values, as shown in Fig. 1, include

performance values of the storage device. Unlike the operation history, which includes a performance value of a disk group, the specification values, which include a performance value of a storage device, do not include historical information.

The terms “performance value” and “specification value” are enabled, for example, at page 14, line 21 to page 17, line 5. Therefore, the claims are based on an enabling disclosure.

III. “Theoretical Performance Value” and “Forecasted Performance Value” Represent Different Features

Although the Examiner did not reject any of claims 1-20 under 35 U.S.C. §112, first paragraph, on the basis of the claims reciting “theoretical performance value” and “forecasted performance value” failing to be based on an enabling disclosure, the Examiner suggests that these features are unclear in view of 35 U.S.C. §112 (see footnote 4 on page 7 of the Office Action). The Examiner cites definitions for “theoretical” and “forecasted” and concludes that the theoretical performance value should be interpreted as the expected availability and the forecasted performance value should be interpreted as the desired threshold minus current usage.

However, Applicants kindly remind the Examiner that when the specification states the meaning that a term in the claim is intended to have, the claim is examined using that meaning, in order to achieve a complete exploration of Applicants’ invention and its relation to the prior art. *In re Zletz*, 893 F.2d 319, 13 USPQ2d 1320 (Fed. Cir. 1989) (see MPEP 2173.05(a)(l)). As such, the Examiner’s

attention is directed to portions of the specification (see generally, for example, page 20, line 8 to page 21, line 23), which state the meaning that “theoretical performance value” and “forecasted performance value” are intended to have.

As shown in Fig. 3, the theoretical performance value 364 and the forecasted performance value 365 represent different values. As described on page 21 (lines 3-7), the theoretical performance value 364 includes read performance 3641 and write performance 3642, and provides an indication of the performance value upon reading time and writing time at which the disk group theoretically exhibits the maximum performance. As further described on page 21 (lines 8-11), the forecasted performance value 365 includes unit time 3651, read performance 3652 and write performance 3653, and provides an indication of the forecasted performance value of the disk group per unit of time. The theoretical performance value 364 is calculated based on the specification values, whereas the forecasted performance value 365 is calculated using the operation history. In this way, the forecasted performance value is based on historical performance.

Applicants submit that the distinguishing features between the theoretical performance value and the forecasted performance value are clearly described in the disclosure. Therefore, the claims that recite this subject matter are based on an enabling disclosure.

35 U.S.C. §102 Rejections

Claims 1 and 18 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Application No. 2004/0120225 to Dalal, et al. (“Dalal”). This rejection

is traversed for the following reasons. Applicants submit that the features of the present invention, as now more clearly recited in claims 1 and 18, are not taught or suggested by Dalal, whether taken individually or in combination with any of the other references of record. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

Amendments were made to the claims to so as to more clearly describe features of the present invention. Specifically, amendments were made to the claims to more clearly describe that the present invention is directed to a volume allocating method in a storage management system as recited, for example, in independent claim 1.

The present invention, as recited in claim 1, provides a volume allocating method in a storage management system for managing the operation of a storage device connected via a network by use of a storage management server. The method includes a step of receiving, via the network, a condition for allocating a volume designated by a client. The method also includes obtaining information on operation history information of the volume from a memory device for storing historical information, including a performance value of a disk group obtained upon actually operating the storage device. Another step includes obtaining specification values from the storage device, where the specification values include the performance value of the storage device. Furthermore, the method includes obtaining a performance margin and using the performance margin to determine a candidate of an allocable volume in accordance with the received condition for

allocating the volume based on the operation history information of the volume and the information on the specification values of the storage device. Also included in the method are steps of transmitting information regarding the volume of the candidate to the client, and receiving information on volume allocation selected and transmitted from the information on the volume of the candidate in the client. The method also includes allocating the volume to the storage device in accordance with the information on the volume allocation. The prior art does not disclose all these features.

The above described features of the present invention, as now more clearly recited in the claims, are not taught or suggested by any of the references of record, particularly Dalal, whether taken individually or in combination with each other.

Dalal discloses a language for expressing storage allocation requirements. However, there is not teaching or suggestion in Dalal of the volume allocating method in a storage management system of the present invention, as recited in claim 1.

Dalal's language for expressing storage allocation requirements provides keywords and rules corresponding to commands for configuring a set of storage devices to provide requested capabilities of a logical volume. The language also provides keywords and constructs for defining capabilities. The language supports direct inheritance of a capability, where a template specifies another template that contains rules to be used to provide a given capability. The language also supports indirect inheritance of a capability, where a template requires a capability but does

not provide an implementation of the capability. In addition, the language is processed to “merge” rules by selecting a single storage device that conforms to more than one rule when possible. Merging rules enables a minimum number of storage devices to be used to meet a given logical volume configuration and set of capabilities.

One feature of the present invention, as recited in claim 1, includes obtaining operation history information of the volume from a memory device for storing historical information, including a performance value of a disk group obtained upon actually operating the storage device. Dalal does not disclose this feature. To support the assertion that Dalal discloses this feature, the Examiner cites Fig. 12 (“History”) and paragraphs [0087], lines 1-7 and [0101], lines 10-21. However, neither the cited drawings nor text, or any other portions of Dalal disclose the claimed features. First, as shown in Fig. 12, Dalal discloses an example of an administration window of a graphical user interface. Several files are listed under “Management Console”. One of those files is “History”. Dalal is silent as to what this “History” file refers to and how it is used in the invention. Next, paragraph [0087] describes a step of obtaining available storage information. In this step, information is gathered about the available storage for implementing the user requirements. This is not the same as obtaining historical information of the volume, including a performance value of a disk group, as in the present invention. Furthermore, paragraph [0101] describes features of Fig. 9, which is a diagram showing the relationship between templates, rules, capabilities, and a logical volume. However,

the use of templates, rules and capabilities is not the same as obtaining historical information of the volume, including a performance value of a disk group, as in the present invention. Therefore, Dalal does not disclose the claimed feature.

Another feature of the present invention, as recited in claim 1, includes obtaining specification values from the storage device, where the specification values include a performance value of the storage device. Dalal does not disclose this feature. To support the assertion that Dalal discloses this obtaining specification values, the Examiner cites paragraph [0114], lines 10-21. However, the cited text describes providing user requirements. This is not the same as obtaining specification values from a storage device, in the manner claimed. Therefore, Dalal does not teach the claimed feature.

Yet another feature of the present invention, as recited in claim 1, includes obtaining a performance margin and using the performance margin to determine a candidate of an allocable volume in accordance with the received condition for allocating the volume, based on the operation history information of the volume and the information on the specification values of the storage device. Dalal does not disclose this feature. To support the assertion that Dalal discloses obtaining a performance margin, the Examiner cites paragraph [0138], lines 1-12, and alleges that the “performance parameter” of Dalal corresponds to the performance margin of the present invention. However, a performance parameter and a performance margin are quite different. Specifically, the values for capabilities such as high performance or medium performance level of Dalal do not amount to a performance

margin of the present invention. A level of performance, such as high or low, is not the same as a margin. The Examiner further cites paragraphs [0088], lines 1-7, [0086], lines 2-19, and [101], line 10-21 to support the assertion that Dalal discloses where a candidate of an allocable volume is determined in accordance with the received condition for allocating the volume based on the information of the operation history of the volume and the information on the specification values of the storage device. However, neither the cited text nor any other portion of Dalal discloses the use of the performance margin to determine a candidate of an allocable volume, or where the candidate is determined based on the operation history information and the information on the specification values of the storage device, in the manner claimed. Therefore, Dalal does not teach the claimed feature.

Therefore, Dalal fails to teach or suggest “obtaining information on operation history of the volume from a memory device for storing, as history, information including a performance value of a disk group obtained upon actually operating the storage device” as recited in claim 1.

Furthermore, Dalal fails to teach or suggest “obtaining information from the storage device on specification values including a performance value of the storage device” as recited in claim 1.

Even further, Dalal fails to teach or suggest “obtaining a performance margin and using the performance margin to determine a candidate of an allocable volume in accordance with the received condition for allocating the volume based on the

information on the operation history of the volume and the information on specification values of the storage device" as recited in claim 1.

Therefore, Dalal fails to teach or suggest the features of the present invention, as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §102(e) rejection of claims 1 and 18 are respectfully requested.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references used in the rejection of claims 1 and 18.

35 U.S.C. §103 Rejections

I. Claims 2, 3, 10, 19, and 20

Claims 2, 3, 10, 19, and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dalal in view of U.S. Patent No. 6,778,078 to Murotani, et al. ("Murotani"), and further in view of U.S. Patent Application No. 2004/0054656 to Leung, et al. ("Leung"). This rejection is traversed for the following reasons.

A. Murotani is Disqualified as Prior Art under 35 U.S.C. §103(c)

As provided in 35 U.S.C. §103(c), subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of 35 U.S.C. §102, shall not preclude patentability under 35 U.S.C. §103 where the subject matter and the claimed invention were, at the time the claimed invention was made, commonly owned, or owned by the same person or subject to an obligation of assignment to the same person. Applications and references

(whether patents, patent applications, patent application publications, etc.) are to be considered by the Examiner to be owned by, or subject to an obligation of assignment to the same person, at the time the invention was made, if Applicants or an attorney or agent of record makes a statement to the effect that the application and the reference were, at the time the invention was made, owned by, or subject to an obligation of assignment to the same person. (See MPEP §706.02(I)(2)(II)).

Accordingly, in response to the rejection of claims 2, 3, 10, 19, and 20 under 35 U.S.C. §103(a) as being unpatentable over Dalal in view of Murotani, further in view of Leung, Applicants submit the following:

The present application (Application Serial No. 10/649,636) and U.S. Patent No. 6,779,078 to Murotani were, at the time the invention of Application Serial No. 10/649,636 was made, owned by Hitachi, Ltd.

As described in MPEP 706.02(I)(2)(II), this statement alone is sufficient evidence to disqualify U.S. Patent No. 6,779,078 from being used in a rejection under 35 U.S.C. §103(a) against the claims of the present invention (U.S. Patent Application Serial No. 10/649,636). Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

B. Dalal in View of Murotani, Further in View of Leung Does Not Teach or Suggest the Present Invention

In addition to Murotani failing to qualify as prior art, Applicants further submit that the features of the present invention, as now more clearly recited in claims 2, 3, 10, 19, and 20, are not taught or suggested by Dalal, Murotani or Leung, whether

taken individually, or in combination with each other in the manner suggested by the Examiner. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

Amendments were made to the claims to so as to more clearly describe features of the present invention. Specifically, amendments were made to the claims to more clearly describe that the present invention is directed to a volume allocating method in a storage management system as recited, for example, in independent claim 19.

The present invention, as recited in claim 19, provides a volume allocating method in a storage management system. The method includes a step of receiving a condition on requested performance per operating time zone of a volume designated by a client. The method also includes referring to history information obtained from a result of actually operating disk groups, and calculating a performance margin of the disk group upon allocating the volumes of the disk groups based on the history information. Also included in the method are the steps of obtaining a volume candidate as an allocation target from the disk groups in accordance with a calculation result, and presenting the volume candidate to the client. The method also includes receiving and storing one volume candidate selected by the client. The prior art does not disclose all these features.

The above described features of the present invention, as now more clearly recited in the claims, are not taught or suggested by any of the references of record.

Specifically, the features are not taught or suggested by Dalal, Murotani or Leung, whether taken individually or in combination with each other.

As previously discussed, Dalal discloses a language for expressing storage allocation requirements. However, there is no teaching or suggestion in Dalal of the volume allocating method in a storage management system of the present invention, as recited in claim 19.

One feature of the present invention, as recited in claim 19, includes receiving a condition on requested performance per operating time zone of a volume designated by a client. As conceded by the Examiner, Dalal does not disclose this feature.

Another feature of the present invention, as recited in claim 19, includes referring to history information obtained from a result of actually operating disk groups. Dalal does not disclose this feature. To support the assertion that Dalal discloses this feature, the Examiner cites Fig. 12 ("History") and paragraph [0087], lines 1-7. However, neither the cited drawings nor text, or any other portions of Dalal disclose the claimed features. First, as shown in Fig. 12, Dalal discloses an example of an administration window of a graphical user interface. Several files are listed under "Management Console". One of those files is "History". Dalal is silent as to what this "History" file refers to and how it is used in the invention. Furthermore, paragraph [0087] describes a step of obtaining available storage information. In this step, information is gathered about the available storage for implementing the user requirements. This is not the same as referring to historical information obtained as

a result of actually operating disk groups, as in the present invention. Therefore, Dalal does not disclose the claimed feature.

Yet another feature of the present invention, as recited in claim 19, includes calculating a performance margin of the disk group upon allocating the volumes of the disk groups based on the history information. Dalal does not disclose this feature. To support the assertion that Dalal discloses this feature, the Examiner cites paragraph [0119], lines 6-14. Based on the remarks of a previous rejection, the Examiner appears to rely upon the “performance parameters” of Dalal as corresponding to the “performance margin” of the present invention. However, a performance parameter and a performance margin are quite different. Specifically, the capabilities such as reliable, high performance, and snapshot-capable, of Dalal do not amount to the performance margin of the present invention. Furthermore, as Dalal does not disclose the use of historical information, in the manner claimed, it follows that Dalal does not teach or suggest calculating a performance margin based on the historical information. Therefore, Dalal does not disclose the claimed feature.

Still yet another feature of the present invention, as recited in claim 19, includes obtaining a volume candidate as an allocation target from the disk groups in accordance with a result of calculating the performance margin and presenting the volume candidate to the client. Dalal does not disclose this feature. The Examiner asserts that Dalal discloses obtaining a volume candidate as an allocation target from the disk groups, but concedes that Dalal does not disclose where the volume candidate is obtained in accordance with a calculation result and presenting the

volume candidate to the client. Applicants agree that Dalal does not teach where a volume candidate is obtained in accordance with a result of calculating the performance margin, in the manner claimed.

Therefore, Dalal fails to teach or suggest "receiving a condition on requested performance per operating time zone of a volume designated by a client" as recited in claim 19.

Furthermore, Dalal fails to teach or suggest "referring to history information obtained from a result of actually operating disk groups" as recited in claim 19.

Even further, Dalal fails to teach or suggest "calculating a performance margin of the disk group upon allocating the volumes of the disk groups based on the history information" as recited in claim 19.

Still even further, Dalal fails to teach or suggest "obtaining a volume candidate as an allocation target from the disk groups in accordance with a calculation result and presenting the volume candidate to the client" as recited in claim 19.

The above noted deficiencies of Dalal are not supplied by any of the other references of record, particularly Murotani. Therefore, combining the teachings of Dalal with Murotani still fails to teach or suggest the features of the present invention, as now more clearly recited in the claims.

Murotani discloses a data storage system and method of hierarchical control of a data storage system. However, there is not teaching or suggestion in Murotani of the volume allocating method in a storage management system of the present invention, as recited in claim 19.

In the Murotani method, logical volumes are selected that are targets for data migration so as to equilibrate the load on a system. The logical volumes are selected based on the accessing data of the physical drives and logical drives under the disk array controller, without increasing the load of the disk array controller. An external manager communicates with two or more disk array controllers, gathers and manages the access data and the configuration data relating to the physical drives and logical volumes of each disk array controller, and prepares an optimum data migration instruction to equilibrate the access load.

One feature of the present invention, as recited in claim 19, includes receiving a condition on requested performance per operating time zone of a volume designated by a client. Murotani does not disclose this feature. To support the assertion that Murotani discloses this feature, the Examiner cites column 7, lines 1-13. However, the cited text merely discloses where an external manager directs migration to disk array controllers by assigning a fuzzy performance series and time zone where increased host access speed is expected. This is not the same as receiving a condition on requested performance per operating time zone and a volume designated by a client, in the manner claimed. Therefore, Murotani does not teach or suggest this feature.

Another feature of the present invention, as recited in claim 19, includes referring to history information obtained from a result of actually operating disk groups. Murotani does not disclose this feature, and the Examiner does not rely upon Muratani for teaching this feature.

Yet another feature of the present invention, as recited in claim 19, includes calculating a performance margin of the disk group upon allocating the volumes of the disk groups based on the history information. Murotani does not disclose this feature, and the Examiner does not rely upon Muratani for teaching this feature.

Still yet another feature of the present invention, as recited in claim 19, includes obtaining a volume candidate as an allocation target from the disk groups in accordance with a result of calculating the performance margin and presenting the volume candidate to the client. Murotani does not disclose this feature, and the Examiner does not rely upon Muratani for teaching this feature.

Therefore, Murotani fails to teach or suggest "receiving a condition on requested performance per operating time zone of a volume designated by a client" as recited in claim 19.

Furthermore, Murotani fails to teach or suggest "referring to history information obtained from a result of actually operating disk groups" as recited in claim 19.

Even further, Murotani fails to teach or suggest "calculating a performance margin of the disk group upon allocating the volumes of the disk groups based on the history information" as recited in claim 19.

Still even further, Murotani fails to teach or suggest "obtaining a volume candidate as an allocation target from the disk groups in accordance with a calculation result and presenting the volume candidate to the client" as recited in claim 19.

The above noted deficiencies of Dalal and Murotani are not supplied by any of the other references of record, particularly Leung. Therefore, combining the teachings of Leung with Dalal in view of Murotani still fails to teach or suggest the features of the present invention, as now more clearly recited in the claims.

Leung discloses techniques for balancing capacity utilization in a storage environment. However, there is no teaching or suggestion in Leung of the volume allocating method in a storage management system of the present invention, as recited in claim 19.

Leung's techniques for balancing capacity utilization in a storage environment automatically determine when capacity utilization balancing is to be performed for a group of storage units in the storage environment. A source storage unit is determined from the group of storage units from which data is to be moved to balance capacity utilization. Utilized-capacity balancing is performed by moving data files from the source storage unit to one or more target storage units in the group of storage units. The storage units in a group may be assigned to one or more servers.

One feature of the present invention, as recited in claim 19, includes receiving a condition on requested performance per operating time zone of a volume designated by a client. Leung does not disclose this feature, and the Examiner does not rely upon Leung for teaching this feature.

Another feature of the present invention, as recited in claim 19, includes referring to history information obtained from a result of actually operating disk groups. Leung does not disclose this feature, and the Examiner does not rely upon Leung for teaching this feature.

Yet another feature of the present invention, as recited in claim 19, includes calculating a performance margin of the disk group upon allocating the volumes of the disk groups based on the history information. Leung does not disclose this feature, and the Examiner does not rely upon Leung for teaching this feature.

Still yet another feature of the present invention, as recited in claim 19, includes obtaining a volume candidate as an allocation target from the disk groups in accordance with a result of calculating the performance margin and presenting the volume candidate to the client. Leung does not disclose this feature. The Examiner relies upon Dalal for teaching “obtaining a volume candidate as an allocation target” but relies upon Leung for disclosing “in accordance with a calculation result and presenting the volume candidate to the client,” citing paragraph [0147], lines 1-13. In this way, it is unclear whether the Examiner asserts that Leung also teaches the performance margin. Nonetheless, Applicants submit that Leung does not teach or suggest where a volume candidate is obtained in accordance with a result of calculating the performance margin, as now more clearly recited in claim 19. As described in paragraph [0147], Leung discloses the use of a storage value score to determine an optimal storage location for storing data to be moved from the source storage unit. This is quite different from obtaining a volume candidate in accordance

with a result of calculating a performance margin, where the performance margin is based on historical information, as in the present invention. Accordingly, neither the cited text nor any other portions of Leung teach or suggest the claimed feature.

Therefore, Leung fails to teach or suggest "receiving a condition on requested performance per operating time zone of a volume designated by a client" as recited in claim 19.

Furthermore, Leung fails to teach or suggest "referring to history information obtained from a result of actually operating disk groups" as recited in claim 19.

Even further, Leung fails to teach or suggest "calculating a performance margin of the disk group upon allocating the volumes of the disk groups based on the history information" as recited in claim 19.

Still even further, Leung fails to teach or suggest "obtaining a volume candidate as an allocation target from the disk groups in accordance with a calculation result and presenting the volume candidate to the client" as recited in claim 19.

Dalal, Murotani and Leung suffer from the same deficiencies relative to the features of the present invention, as recited in the claims. Therefore, combining the teachings of Dalal, Murotani and Leung does not render obvious the features of the present invention, as now more clearly recited in claim 19. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of claim 19 as being unpatentable over Dalal in view of Murotani, and further in view of Leung, are respectfully requested.

Claims 2, 3 and 10 are dependent on claim 1, and claim 20 is dependent on claim 19. Therefore, Applicants submit that claims 2, 3 and 10 are allowable for at least the reasons discussed previously regarding independent claim 1, and claim 20 is allowable for at least the reasons discussed previously regarding independent claim 19.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references used in the rejection of claims 2, 3, 10, 19, and 20.

II. Claims 4-9 and 11-17

Claims 4-9 and 11-17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dalal in view of Leung. This rejection is traversed for the following reasons. Applicants submit that the features of the present invention, as now more clearly recited in claims 4-9 and 11-17, are not taught or suggested by Dalal or Leung, whether taken individually, or in combination with each other in the manner suggested by the Examiner. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

Amendments were made to the claims to so as to more clearly describe features of the present invention. Specifically, amendments were made to the claims to more clearly describe that the present invention is directed to a storage management server or a program for selecting and generating a volume candidate, as recited, for example, in independent claims 4, 9 and 11.

The present invention, as recited in claim 4 and as similarly recited in claims 9 and 11, provides a storage management server for managing the operation of a storage device connected via a network. The storage management server includes a database for operation history that stores historical information including a performance value of a disk group obtained upon operation of the storage device. The storage management server also includes a database for volume performance value that stores specification values, including the performance, reliability, and a capacity of the storage device obtained from the storage device. The storage management server further includes a policy database that stores information on policies including the performance corresponding to a plurality of set policies. Also included in the storage management server is a first processing means that calculates performance value using the information on the performance value of the disc group stored in the database for operation history. The storage management server also includes a second processing means that obtains a performance margin, which is based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means. Furthermore, the storage management server includes a volume determination processing means that determines an allocation candidate for allocating the volume in accordance with a calculation result of the second processing means. The prior art does not disclose all these features.

The above described features of the present invention, as now more clearly recited in the claims, are not taught or suggested by any of the references of record.

Specifically, the features are not taught or suggested by Dalal or Leung, whether taken individually or in combination with each other.

As previously discussed, Dalal discloses a language for expressing storage allocation requirements. However, there is not teaching or suggestion in Dalal of the storage management server or the program for selecting and generating a volume candidate, as recited in claims 4, 9 and 11.

One feature of the present invention, as recited in claim 4 and as similarly recited in claims 9 and 11, includes a database for operation history that stores historical information including a performance value of a disk group obtained upon operation the storage device. Dalal does not disclose this feature. To support the assertion that Dalal teaches this feature, the Examiner cites Fig. 12 and paragraph [0101], lines 10-21. However, neither the cited drawings nor text, or any other portions of Dalal disclose the claimed features. First, as shown in Fig. 12, Dalal discloses an example of an administration window of a graphical user interface. Several files are listed under “Management Console”. One of those files is “History”. Dalal is silent as to what this “History” file refers to and how it is used in the invention. Furthermore, paragraph [0101] describes features of Fig. 9, which is a diagram showing the relationship between templates, rules, capabilities, and a logical volume. However, the use of templates, rules and capabilities is not the same as the use of an operation history of the performance value of a disk group, as in the present invention. Therefore, Dalal does not disclose the claimed feature.

Another feature of the present invention, as recited in claim 4 and as similarly recited in claim 11, includes a database for volume performance value that stores specification values, which include performance, reliability, and a capacity of the storage device. Dalal does not disclose this feature. To support the assertion that Dalal teaches this feature, the Examiner cites Fig. 11, item 1004 and paragraph [0180], lines 3-16. However, as more fully described in paragraphs [0178] to [0181], Dalal discloses the use of user templates, which are specifically configured for a particular application or intended use. The values of the user templates are specified by a user, and are not obtained from the storage device, as in the present invention. Therefore, Dalal fails to teach this feature.

Yet another feature of the present invention, as recited in claim 4 and as similarly recited in claims 9 and 11, includes a first processing means that calculates a forecasted performance value from the performance value information of the disk group stored in the database for operation history. As conceded by the Examiner, Dalal does not teach this feature.

Still yet another feature of the present invention, as recited in claim 4 and as similarly recited in claims 9 and 11, includes a second processing means that obtains a performance margin, which is based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means. Dalal does not disclose this feature. To support the assertion that Dalal discloses a second processing means that obtains a performance margin, the Examiner cites paragraph [0119], lines 6-14. Based on the remarks of a previous

rejection, the Examiner appears to rely upon the “performance parameters” of Dalal as corresponding to the “performance margin” of the present invention. However, a performance parameter and a performance margin are quite different. Specifically, the capabilities such as reliable, high performance, and snapshot-capable, of Dalal do not amount to a performance margin of the present invention. Furthermore, and as conceded by the Examiner, Dalal does not disclose where a performance margin is based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means, in the manner claimed.

Therefore, Dalal fails to teach or suggest “a database for operation history which stores, as history, information including a performance value of a disk group obtained upon operating the storage device” as recited in claim 4, and as similarly recited in claims 9 and 11.

Furthermore, Dalal fails to teach or suggest “a database for a volume performance value which stores information on specification values including performance, reliability, and a capacity of the storage device obtained from the storage device” as recited in claim 4, and as similarly recited in claim 11.

Even further, Dalal fails to teach or suggest “first processing means which calculates a forecasted performance value from the information on the performance value of the disk group stored in the database for operation history” as recited in claim 4, and as similarly recited in claims 9 and 11.

Yet even further, Dalal fails to teach or suggest “second processing means which obtains a performance margin, based on a theoretical performance value of

the volume and the forecasted performance value obtained by the first processing means" as recited in claim 4, and as similarly recited in claims 9 and 11.

The above noted deficiencies of Dalal are not supplied by any of the other references of record, particularly Leung. Therefore, combining the teachings of Dalal with Leung still fails to teach or suggest the features of the present invention, as now more clearly recited in the claims.

As previously discussed, Leung discloses techniques for balancing capacity utilization in a storage environment. However, there is no teaching or suggestion in Leung of the storage management server or the program for selecting and generating a volume candidate, as recited in claims 4, 9 and 11.

One feature of the present invention, as recited in claim 4 and as similarly recited in claims 9 and 11, includes a database for operation history that stores historical information including a performance value of a disk group obtained upon operation the storage device. Leung does not disclose this feature, and the Examiner does not rely upon Leung for teaching this feature.

Another feature of the present invention, as recited in claim 4 and as similarly recited in claim 11, includes a database for volume performance value that stores specification values, which include performance, reliability, and a capacity of the storage device. Leung does not disclose this feature, and the Examiner does not rely upon Leung for teaching this feature.

Yet another feature of the present invention, as recited in claim 4 and as similarly recited in claims 9 and 11, includes a first processing means that calculates

a forecasted performance value from the performance value information of the disk group stored in the database for operation history. Leung does not disclose this feature. To support the assertion that Leung discloses this feature, the Examiner cites paragraph [0142], lines 1-5 and paragraph [0143], lines 1-18. The cited text describes a desired threshold for a storage system, the current usage value, and the cost. The cited text further describes the use of determining the availability of a storage unit in calculating a storage value score. These features of Leung are quite different from calculating a forecasted performance value from performance value information of the disk group stored in the database for operation history, as in the present invention. As previously discussed, when the specification states the meaning that a term in the claim is intended to have, the claim is examined using that intended meaning. The forecasted performance value of the present invention provides an indication of the forecasted performance value of the disk group, per unit time (see page 21, lines 8-11). Unlike the present invention, Leung does not disclose determining using a database for operation history to calculate a forecasted performance value, in the manner claimed.

Still yet another feature of the present invention, as recited in claim 4 and as similarly recited in claims 9 and 11, includes a second processing means that obtains a performance margin, which is based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means. Leung does not disclose this feature. The Examiner relies upon Dalal for teaching a second processing means that obtains a performance margin, but the

relies upon Leung for teaching where the performance margin is based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means. In this way, it is unclear whether the Examiner asserts that Leung also teaches the performance margin. Nonetheless, Applicants submit that Leung does not teach or suggest a performance margin, where the performance margin is based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means, in the manner claimed. To support the assertion that Leung discloses the claimed features, the Examiner again cites paragraph [0142], lines 1-5 and paragraph [0143], lines 1-18. As previously discussed, Leung does not disclose calculating a forecasted performance value, in the manner claimed. It follows that Leung does not disclose obtaining a performance margin, which is based on a forecasted performance value obtained by the first processing means, as claimed. Also as previously discussed, when the specification states the meaning that a term in the claim is intended to have, the claim is examined using that intended meaning. As provided in the specification, the theoretical performance value provides an indication of the performance value upon reading time and writing time, at which the disk group theoretically exhibits the maximum performance. Neither the cited text nor any other portions of Leung teach or suggest this feature.

Therefore, Leung fails to teach or suggest "a database for operation history which stores, as history, information including a performance value of a disk group

obtained upon operating the storage device" as recited in claim 4, and as similarly recited in claims 9 and 11.

Furthermore, Leung fails to teach or suggest "a database for a volume performance value which stores information on specification values including performance, reliability, and a capacity of the storage device obtained from the storage device" as recited in claim 4, and as similarly recited in claim 11.

Even further, Leung fails to teach or suggest "first processing means which calculates a forecasted performance value from the information on the performance value of the disk group stored in the database for operation history" as recited in claim 4, and as similarly recited in claims 9 and 11.

Yet even further, Leung fails to teach or suggest "second processing means which obtains a performance margin, based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means" as recited in claim 4, and as similarly recited in claims 9 and 11.

Both Dalal and Leung suffer from the same deficiencies relative to the features of the present invention, as recited in the claims. Therefore, combining the teachings of Dalal and Leung does not render obvious the features of the present invention, as now more clearly recited in claims 4, 9 and 11. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of claims 4, 9 and 11 as being unpatentable over Dalal in view of Leung, are respectfully requested.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references used in the rejection of claims 4-9 and 11-17.

In view of the foregoing amendments and remarks, Applicants submit that claims 1-20 are in condition for allowance. Accordingly, early allowance of claims 1-20 is respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of Mattingly, Stanger, Malur & Brundidge, P.C., Deposit Account No. 50-1417 (referencing attorney docket no. 520.43064X00).

Respectfully submitted,

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.


Donna K. Mason
Donna K. Mason
Registration No. 45,962

DKM/sdb
(703) 684-1120